

Richard M. Males
RMM Technical Services, Inc.
3319 Eastside Avenue
Cincinnati, Ohio 45208
(513) 871-8566 males@iac.net

revision: 7/20/2004

EDUCATION

Ph.D., Water Resource Systems Analysis, MIT, September 1968
MS in Civil Engineering, Hydraulics, MIT, September, 1964
BS in Civil Engineering, MIT, June 1963

Qualifications

Dr. Males has worked professionally in consulting since 1968, and, since 1982, has been owner and principal of RMM Technical Services, Inc., an independent consulting firm providing technical and computer support activities to a wide range of government, business, and non-profit agency clients, including: the US Army Corps of Engineers; the US Environmental Protection Agency; water supply utilities in California and Pennsylvania; two Fortune 100 companies; non-profit agencies and schools in Ohio, New Jersey, and New York; and other consulting firms.

Dr. Males' primary professional activities have been in the arenas of development and effective use of computer-based tools, with emphasis on water resource systems applications. Areas of work include: design and implementation of advanced planning methodologies; simulation modeling; risk-based analysis; multi-criterion decision-making techniques; data base, budgeting, tracking, and decision support systems; mathematical modeling; geographic information systems development and applications; computer graphics and CAD applications; and laboratory data systems.

Dr. Males has written over 40 professional papers and technical reports in a variety of fields. He served as co-author of a chapter in the recently-published book "Water Supply Systems Security", McGraw Hill, 2004

Dr. Males has worked with computers since 1960, and is an experienced programmer in a number of languages. His particular emphasis in computer work has been on Monte Carlo simulation, data bases, decision support systems, multi-criterion decision aids, mathematical modeling, laboratory information systems, geographic information systems, computer graphics, mapping, and CAD/CAM applications. His recent work areas include object-oriented simulation models for risk-based analysis of navigation (deep-draft harbors, inland waterways and locks); coastal shore protection modeling; Monte Carlo simulation models for repair/rehabilitation of hydropower and levees; and development of decision support systems. .

Over the past 18 years, Dr. Males has been deeply involved in the design, development and application of many of the tools that IWR has created, including: IWR-Plan, Multi-Criterion Decision Aid Tool, Shore Protection Model, NavSym, HarborSym, LockSym, Automated Budget System (ABS) and the Hoover Dike model. For IWR, he authored the report “Beyond Expected Value: Making Decisions Under Risk and Uncertainty”, September 2002, IWR Report 02-R-4, and was a primary author of “Tools For Risk Based Economic Analysis”, February 1999, IWR Report 99-R-2.

Related Recent Project Experience

Shore Protection Model

The Shore Protection Model is a Monte Carlo simulation model that is designed to assist in evaluation of beach nourishment projects. The model has been developed in close cooperation with a number of Corps offices, including IWR, ERDC, and the Wilmington District, and will be applied by the Mobile District in the Walton County Beaches study. Dr. Males developed a series of design documents for the model, developed prototypes, designed the database structures, and programmed the computational kernel that carries out the simulation.

Deep-Draft Navigation Model (HarborSym)

In cooperation with IWR, the Galveston District, and the Jacksonville District, Dr. Males has participated in the development of the HarborSym deep draft Monte Carlo simulation model for examination of channel widening and anchorages. Originally developed and applied to the Sabine-Neches Waterway for the Galveston District, the model has since been enhanced for application to Tampa Bay. The model is a data-driven model that determines delays encountered by vessels traversing a port, for with and without-project conditions.

LockSym

The LockSym model is an event-driven Monte Carlo simulation model of a single lock, designed for use in rehabilitation studies. The model estimates costs of delays, repairs, and rehabilitation, for the with and without project condition. The model was originally developed as the Life Cycle Lock Model (LCLM), and applied to the Lower Monumental Lock and Dam study for the Walla Walla District. Dr. Males worked on the project team developing the original LCLM and the current LockSym, doing the design and programming the computational kernel.

Multi-Criterion Decision Analysis / Tradeoff Analysis / Visualization

Dr. Males has worked on a variety of efforts for the Corps in support of generic tools for decision-making and tradeoff analysis. He is currently assisting in the development of an Engineer Pamphlet to support of EC 1105-2-404 (Planning Civil Works Projects Under the Environmental Operating Principles), which dictates that tradeoff analysis should be used in NED/NER project evaluation.

He developed a prototype multi-criterion decision aid module for IWR-Plan, that has since been incorporated into the IWR-MCDM software, currently under development. He has developed a technique for determining the multi-variable efficient frontier, important for extension of IWR-Plan to more than a single cost and output variable. He developed a prototype multiple criterion ranking for work packages within the Automated Budget System, as well as a “knapsack algorithm” approach to choosing work packages under budgetary constraints.

He has developed presentations and examples on advanced multi-variate visualization techniques for use with Corps modeling and analysis.

Risk-Based Decision Making

Under the direction of Michael Walsh of IWR, Dr. Males prepared the report “Beyond Expected Value: Making Decisions Under Risk and Uncertainty”, September 2002, IWR Report 02-R-4, to address this issue. The approach proposed in the report involves treating the problem as a multiple-criterion decision, in which variability is expressly measured and incorporated into the choice.

Waterway Simulation Model (NavSym)

In a series of projects, originally carried out for the Galveston District of the Corps of Engineers and the Institute for Water Resources, Dr. Males worked on a project team that developed an event-driven Monte Carlo simulation model of tows moving on a waterway, for use in analysis of navigation improvements. The model simulates the movement of individual tows from port to port on a waterway network, defined as a set of reaches. The model accounts for each tow movement on the waterway, and handles traffic rules and congestion in waterway reaches. The model is general in nature, with user definition of the waterway, tow distribution, port-to-port shipment statistics, transit times and rules in each reach. Uncertainty is incorporated through the port-to-port shipments and reach transit times, which are defined by statistical distributions. The model has recently been extended to include incorporation of locks within the system, additional economic analysis, and increased user interface capabilities.

Dike Performance Model

Dr. Males developed a Monte Carlo simulation model of Hoover Dike, surrounding Lake Okeechobee, Florida, in conjunction with IWR and the Jacksonville District. The model provides analysis of rehabilitation alternatives through a life cycle simulation of dike performance in response to changing lake stages and hurricane surge. The model handles multiple land uses, degree of flooding, monetary and non-monetary damages, and consequences of repeated flooding, as well as repair and rehabilitation costs, providing detailed and summary output on benefits and costs. The model has been used in conjunction with the Herbert Hoover Dike Major Rehabilitation Evaluation.

Selected Recent Publications List - Richard M. Males

“Source Water Early Warning Systems”, W.M. Grayman, R.A. Deininger, R.M. Males, R.W. Gullick. Chapter in Water Supply Systems Security, Edited by Larry Mays, McGraw-Hill, 2004.

“Beyond Expected Value: Making Decisions Under Risk and Uncertainty”, September 2002, IWR Report 02-R-4

“Risk-Based Modeling of Early Warning Systems for Pollution Accidents”. W.M. Grayman and R.M. Males. Water Science and Technology, 46(3): 41-49, London, UK: IWA Publishing. 2002.

“River Basin Early Warning Systems for Source Water Contamination”, W.M. Grayman, R.A. Deininger, R.M. Males. Proceedings IWA 9th International Conference on Watershed and River Basin Planning, London, UK: IWA. 2002.

“Design Of Early Warning and Predictive Source-Water Monitoring Systems”. W.M. Grayman, R.A. Deininger, and R.M. Males *AWWA Research Foundation*, Denver Colo.: AWWA. 2001.

“Risk-Based Modeling of Early Warning Systems for Pollution Accidents”. W.M. Grayman and R.M. Males. Proceedings IWA 2nd World Water Congress, London, UK: IWA. 2001.

“A Risk-Based Simulation Model for Design and Analysis of Early Warning Systems for Source Water Contamination”, W.M. Grayman and R.M. Males, Proc. AWWA Annual. Conf., AWWA, Denver, CO, 2001.

“Early Warning and Source-Water Monitoring Systems, W.M. Grayman, R.A. Deininger, R.M. Males, Proc. Water Quality Tech. Conf., AWWA, Denver, CO, 2000.

“Tools For Risk Based Economic Analysis”, February 1999, IWR Report 99-R-2.